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THE ARGENTINE ANT IN CALIFORNIA.

BY

C. W. WOODWORTH.

A pest that may easily prove to be the most troublesome insect ever introduced into the State has been recently discovered in our midst. Specimens of this insect were collected about a year ago by Mr. J.



Fig. 1. The Argentine Ant, greatly enlarged. The actual size is shown in small figure below.

Chester Bradley, at that time an assistant in the Entomological Department of the University of California. The species was not recognized by him at the time as anything unusual and only within the last two months has the presence of the Argentine ant in the State been

known. The identification of the insect was made by Professor W. M. Wheeler of the American Museum of Natural History, to whom these specimens of ants collected by Mr. Bradley had been submitted for identification. Dr. Wheeler at once made known the character of the insect and the writer has just returned from a trip east, where he consulted with Mr. Bradley and Dr. Wheeler and then proceeded to New Orleans and had opportunity to study the insect in that region, where it has been highly injurious for a number of years. Professor E. S. G. Titus, who was the representative of the United States Division of Entomology to study the pest in New Orleans, has also recently visited with me one of the infested areas in this State and verified the insect in the laboratory and field.

The exact locality of the collection made by Mr. Bradley has not been determined. It was supposed by him to be Ontario, but very careful examination of the ants of that district has been made without finding this species. It has been found abundantly, however, in the following northern localities, East Oakland, Alameda, San Francisco, San Jose, Cupertino, and a point near Campbell. In the southern part of the State Prof. H. J. Quayle has just located a small colony in Los Angeles and another at Azusa and a third at Upland.

The Argentine ant is primarily troublesome as a household pest, but in Louisiana it has also proven of first importance in the sugar cane fields, and in the orange orchards. The writer fears that, besides its other injurious habits, it may not be second in importance from the orange grower's standpoint to the introduction of the white fly, to which attention was called by this station a year ago, and which seems to be gradually spreading over the State.* Of course, there is a possibility that the insect may not prove equally troublesome in all parts of California on account of our peculiar climate; but, on the other hand, it may prove even more troublesome than at New Orleans. Indeed, Professor Newell of the Louisiana Crop Pest Commission, who has given more attention to a careful study of this insect than any one else, expressed to me his belief that our climate would be more favorable for the ant than that of Louisiana. At any rate the possibility of the insect becoming a pest in California comparable to the work it has already done in Louisiana should cause us to give the matter the most serious consideration.

* Prof. Titus of the Utah Agricultural College and Special Agent of the U. S. Division of Entomology, tells me that while not particularly looking for the insect, he noted the presence of the White Fly, *Aleurodes citri*, in Chico and Visalia.

HISTORY IN OTHER COUNTRIES.

As the name Argentine ant suggests, the insect was first described from the Argentine Republic. It is common also in Brazil and is doubtless native to the southern part of South America. No one has given us an account of the seriousness of the insect in its native country. The only record we have of the insect in other countries is its presence in Madeira, where it was reported as long ago as 1898 to have entirely displaced other species and become apparently the same sort of a pest which it has proven to be about New Orleans. It was noted as early as 1891 along the wharves in New Orleans, where the coffee ships from Brazil were docked. By 1895 another region five or six miles up the river was noticed to be infested. In 1899 they were already present at Audubon Park. By 1904 Mr. Titus of the United States Department of Agriculture, who was the first to give us a full account of these insects, records them from many points along the railroads leading out of New Orleans, as well as a large part of the town. Professor Newell this year reports them as occupying fully five thousand square miles of territory, extending from New Orleans southward to the Gulf of Mexico; to the north and west one hundred and eighty to two hundred miles; and east beyond the boundary of the State; and wherever the insect has become abundant it has proven itself by far the most troublesome species of ant, and has practically driven out all other species. The spread of the species will thus be seen to be rather slow, but it completely occupies all the territory it infests.

RELATION TO OTHER INSECTS.

Like many other kinds of ants, the Argentine species is very much attracted by the secretions of scale insects and plant lice. Every tree in New Orleans and adjacent towns is continually patrolled by these ants and there seems to be very good evidence that the ants care for certain of these insects in much the same way as the corn root aphid is cared for in the Mississippi Valley by the common ant of the corn fields. At any rate, the writer has repeatedly noticed ants carrying mealy bugs and other insects of this general class, and it is well known that the mealy bug so injurious to sugar cane is very much worse where the ant is abundant. Exactly the same habits are observable in the infested districts here in California. Some of our native species of ants have been justly accused of protecting the woolly aphid, and probably scale insects have been defended from their parasites in many

instances. In this State, where plant lice and scale insects are naturally so injurious, this tendency of the Argentine ant to care for these insects may be a particularly serious feature of the situation.

Attention has already been directed to the tendency of these ants to destroy other species of the same group. Many observers have noted the battles of the ant in Louisiana, which invariably result in the defeat of the other species, so that the only ant now found in the houses in the infested territory is this imported species. As far as our observations have gone the Argentine ant completely destroys all native ants in the infested regions. This is a case of replacing one bad pest by another still worse. There are a few cases, however, in which the ant has been somewhat of a benefit. Professor Newell tells me that one reliable correspondent reports the ants as having entirely destroyed the bed bugs in the poorer sections of New Orleans, and the very annoying pests known in the south as chiggers have disappeared in the neighborhood of Audubon Park, apparently on account of the presence of the ant. These slight benefits, however, in no way offset the damages done by this pest.

DAMAGE TO CITRUS TREES.

The direct attack of these insects upon citrus trees is a matter that can not be other than of the highest importance to California growers. At the Louisiana Experiment Station at Audubon Park the production of oranges was entirely prevented this year through the attack of these insects upon the opening blossoms, or if these escape, upon the young fruit itself. It was too late in the season for me to see the method of attack when I visited New Orleans, but as described to me, it consists in the insect simply boring into the center of the bud and eating or injuring enough of the substance to cause its destruction. This method of attacking the blossoms of plants is not by any means confined to oranges, since many other kinds of flowers are also attacked. The ant has entirely destroyed the cut flower industry in New Orleans. In some of the orchards about New Orleans numerous methods have been tried to prevent the insects climbing the trees, but even as effective a barrier as tree tanglefoot has proven effective only for a day or two. The insects soon cross the bands upon particles of dust or upon the dead bodies of other members of the colonies. There is a possibility that our method of keeping a dry mulch on the surface of the ground in orchards will prevent the formation of burrows, and therefore keep our orchards fairly free from the insects, but their habit of nesting among the roots of trees, and that of traveling long distances may enable them nevertheless to do the same injury here as in Louisiana.

HOUSEHOLD PEST.

It is primarily, however, as a household pest that this insect has made itself dreaded in Louisiana. No insect has ever given the people of that district so much annoyance and no insect has been so hard to control as the Argentine ant. It has fully maintained its reputation in the infested districts here in California. Its habits are very similar to those of other species, but its ceaseless wandering and small size enable it to seek out every hiding place, and whenever food is found they will soon be swarming in countless numbers.

The old and well-known method of placing the legs of tables in dishes of water for instance is of no avail whatever against this species of ants, since the slightest accumulation of dust on the surface of the water furnishes a sufficient bridge over which the ant can pass. It is a very general feeder, eating anything that other species of ants attack, including all kinds of food materials, and both Professor Titus and Professor Newell report cases where they have directly attacked infants in a most distressing manner, and are capable of biting severely enough to be quite a nuisance to larger human beings.

It is much more successful than any of our native species in obtaining food. Just outside of the infested district the native species are normally abundant. An area which would afford foraging ground for a hundred native ants is infested by fully ten thousand of the Argentine species.

STORED PRODUCTS.

The Argentine ant proves very annoying in warehouses and stores, as well as in residences. Every kind of food product seems to be attacked by these creatures. Fruits, dry and fresh, meal, sugar, etc., are all subject to attack, and the impossibility of protecting such products from attack makes it unusually exasperating.

OCCURRENCE IN CALIFORNIA.

We already have numerous species of ants in this State. The family to which this ant belongs is distinguished from other ants by the structure of the face, shown in figure 2. In related ants the ridges near the antennae arise from the upper edge of the clypeus. The most satisfactory character for identification of the Argentine ant in distinguishing it from the other members of this family is the arrangement of the teeth, shown also in figure 2. All other species have some other arrangement. The Argentine bears the name *Iridomyrmex humilis* Mayr. One other member of this genus is found in the

Southern States. Other species occur in South America, in southern Asia and Australia.

More Information Needed.—We are far from certain that the distribution of the Argentine ant is limited to the localities mentioned above. It would be very desirable to know at the earliest possible moment of the presence of the insect in any locality because of the possibility of eradication. Eradication is possible, and has often been

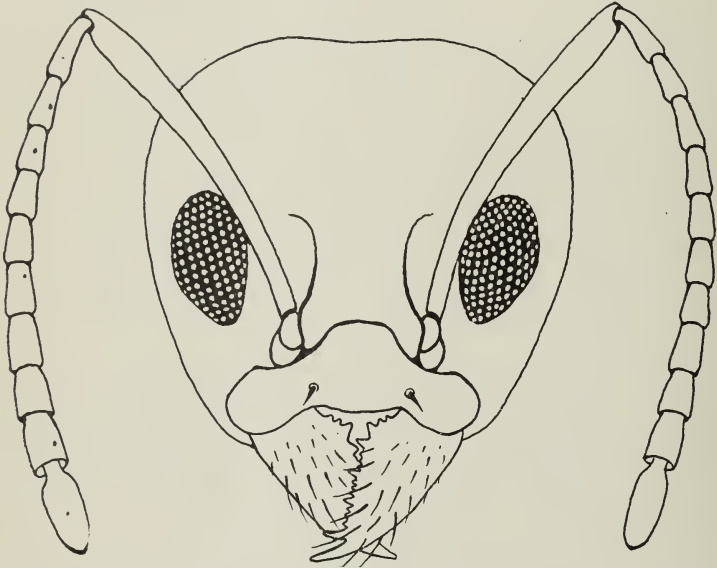


Fig. 2. The Argentine Ant. Face view showing the characteristic arrangement of the teeth.

accomplished with a variety of insects when taken soon enough. We would like to suggest, therefore, that specimens of ants of all kinds be sent in to the Experiment Station for authentic determination. We will be very pleased to examine and report upon all such material sent.

How to Send Specimens.—Specimens may be sent through the mail if enclosed in any tight receptacle. We would suggest for this purpose the use of an ordinary gelatin capsule. These can be obtained at any drug store. The insects can be collected by wetting the finger and putting it quickly over the ants, and before they can untangle themselves they can be enclosed in the capsules. Put but a single ant in each capsule, but collect two or three at least of each kind. It is very desirable to have a considerable number because of the danger of individual specimens being damaged, three or four will be amply suffi-

cient. If more than one kind is collected keep them separate and give the exact locality of each. The capsules may be enclosed in a small box and mailed to the Entomological Department, University of California.

LIFE HISTORY.

The whole life history of the Argentine ant has not yet been made out. Professor Newell has given us the most complete account of these insects, and has secured a splendid lot of observations which he will probably publish later. As far as his studies have gone, there are only three forms in the case of this species;—the worker ant, which is the one commonly found about the surface of the ground, and the only one which is ordinarily observed; the queen, or female considerably larger than the worker; and at certain seasons there are often a considerable number of winged males. Young winged females also occur at times in considerable numbers. These soon lose their wings and become the ordinary queens. In every nest there will be found a great number of ants in the early stages. The eggs and very young ants are often stuck together and are handled by the worker ants *en masse*. Before the young grubs become half-grown they will be cared for individually. The ants are continually tending these young, feeding them from day to day, and transporting them about from one part of the nest to another to maintain heat and moisture conditions most satisfactorily, and when one breaks into a nest he will observe the workers busy trying to rescue these young insects. When the larvae become full grown they transform into a pupal stage in which the legs and other appendages of the full grown insect are readily seen, but which are not capable of movement. This ant does not spin a cocoon in this stage as is common in many species. Finally, just before the ant emerges as a perfect insect, one can observe the color of the eyes and then of the rest of the body, beginning first as a pale brown, but before emergence becoming almost as dark as the older ants. Previous to this time the insects are almost pure white.

Nest Habits.—The Argentine ant is a persistent nest builder and digs burrows everywhere. The nest, however, is not a compact affair, but consists simply of burrows often isolated from each other, often deserted and then re-occupied, and there is not the sharp distinction between families which is observed among so many ants. Mother insects may be dwelling contentedly together; indeed, the ants of one district seem to form one large family, no matter how many burrows or how many separate establishments may be founded.

Means of Distribution.—The Argentine ant seems to be continually on the move. Nearly everywhere one can see long caravans of ants occupied in transporting the young from nest to nest. In this way after a colony has been established in one locality it can spread throughout the surrounding region, though the rate of progress of course will be small. There are no data whatever to enable us to determine exactly how fast they might go by this means. It is likely however that they will only go fast enough to provide for increase in numbers. They will be able thus to completely occupy the territory invaded and the movement can be considered due to the need for better feeding grounds. At the time of the flight of the winged insects it is possible that more rapid extension might occur, but no ants are strong fliers, and it is not likely that they would make such progress as might be made in a season by the ordinary migrations of a prosperous colony. The distribution from one colony to another distant center is doubtless always brought about by artificial means. The distribution in Louisiana is very good evidence along this line. The insects are found in great abundance along the Mississippi River from New Orleans southward, where they were evidently carried by drift wood in which they had established themselves, and in all other directions simply along the lines of the railroad. The habit the insect has of constantly moving its colonies makes it very easy for a colony to be transported *in toto*, having established itself in some box of merchandise. Potted plants or even nursery stock with the earth balled would be very favorable means of transportation of small colonies. Its introduction to California was very likely by rail, and it is likely that it will very largely follow the main lines of transportation in its distribution over the State. As far as we are aware, it is necessary for enough of a colony to include one queen at least, to be transported into a new region in order to establish itself. Because of its habits, however, it would be very easy to have this accomplished since the colony brought into a region would be very likely to remove from the package in which it was transported and establish itself in the ground in its new home.

REMEDIES FOR ANTS.

There are a great many remedies suggested and in use for the control of ants. These may be classed in three categories: first, destruction of colonies; second, the interposing of barriers; and third, ant proof construction. With many species of ants the destruction of a colony is not a difficult matter, the nest being a very definite structure with only a few openings, and housing all of a single family.

The best remedy to be used in such a case is carbon bisulfid, and a small amount of this, say a teaspoonful, placed in an ordinary ant's nest, especially when the ground is not too dry, will result usually in the death of the whole colony. The opening at the surface of the ground should be covered tightly, and if the carbon bisulfid is effective, no further signs of the colony will be observed beyond a few wandering individuals that were foraging at the time the carbon was applied. These are relatively short-lived, and soon disappear. This method is probably the best that can be followed even in the case of the Argentine ant, but because of the relative great numbers of queens and the innumerable openings, the difficulty of destroying these ants in any region becomes very much greater than with the ordinary species. Still it is probable that colonies in the ground can be destroyed in this manner. Where colonies occur however in the woodwork of houses or the other buildings, or in the bark or rotten places in tree trunks, as is true of this species, the problem becomes very evidently still more difficult.

Barriers.—Barriers consist of substances either repellent or difficult of passage. Of the repellent substances, corrosive sublimate seems to have been about the most effective. It is not yet known exactly why such a substance should be repellent to ants, but it has proven so and is fairly effective against the Argentine species. It will not be found to be completely satisfactory however. Barriers across which ants find difficulty in passing are water, vaseline and tanglefoot, either of which is completely effective as long as its surface remains clean; but dust particles or dead bodies of other ants will in each case finally form a bridge over which the insects can pass. They are, however, sufficiently effective to be extremely useful, as a control measure and will be found very efficient for our common larger species, but least effective against the Argentine ant of all the ants occurring in this country.

Ant Proof Construction.—Of course this is the best solution of the problem. Where ants cannot be eradicated all containers of food material should be made ant tight in every region where ants are troublesome. This is something that is quite possible even for single rooms or dwelling houses, though it will require very different methods from those which are in vogue in ordinary residence construction. These ants do not burrow in wood but live in cracks or in rotten wood. The important thing of course is to see to it that no cracks through which ants can come are allowed to remain. In wooden houses this can be accomplished by a free use of putty and paint, and special provisions about the openings such as windows and doors, and by constant

attention to any cracks that may form through the drying or warping of the wood. In the case of warehouses the use of concrete as far as possible is thoroughly to be recommended, since this is fairly free from danger of cracking in a way to admit ants. The most serious difficulty in ant proof construction is the impossibility of free ventilation.

SUGGESTIONS FOR ERADICATION.

From what has been said above it will be seen that the control of this species of ant is particularly difficult and it would seem therefore a very wise policy at the present time, while the species has such a limited distribution, to entirely eradicate it. If this is undertaken, however, it should be with the appreciation of the fact that the work involved is very great even for a small colony, because in eradication work only the last individual queen insect is of any importance. The simple reduction of numbers will not justify the effort that would be put forward.

The first work that should be done towards eradication is to find a practical means of limiting the spread from the existing colonies. Perhaps a water barrier reinforced with oil may prove most feasible, but much experimental work should at once be provided for to determine the wisest procedure.

The next step would be naturally the attempt to destroy all the nests in one of these areas. Carbon bisulfid is the most promising means to use, but here again experimental work might result in the discovery of more efficient means. When these two steps are successfully taken the remainder of the work is but the continuance of the campaign along these lines.

HOW THIS WORK MAY BE DONE.

There is no legal authority in the State whose duties would include the eradication of a household pest unless it be in those counties having County Entomologists, whose duties are whatever the Supervisors creating these offices direct. As a fruit pest, however, it falls in the domain of the State Commissioner of Horticulture and of the County Boards. The laws, however, creating these offices—while granting abundant authority and originally designed to meet just such emergencies—nevertheless fail to provide the necessary means and facilities for investigation which must first be made when a new kind of pest is introduced before effective work can be done and which must accompany the work in most cases as long as it is under way.

If anything is to be done at all it requires therefore that public-spirited citizens interest themselves in the matter and see that the machinery of government by which emergencies are met be set in motion.

It should be understood that the whole State is interested in this matter, and not simply the communities where the insect is now present. There is no reason to expect this insect to spread in this State less rapidly than in Louisiana, and if that is accomplished the insect will be infesting the homes of ninety percent of the population of the State within ten years. If one community destroys the insects in its midst it stands in continuous danger of becoming re-infested, thus necessitating doing the work over again. Thus far the insect is practically confined to towns. For many years this was true in Louisiana. The ants spread very slowly through the towns, infesting block after block, coming to the towns in shipments by rail or boat and only spreading into the country after completing the infestation of the towns. Now they are beginning to appreciate the danger to their cane and orange crops after five thousand square miles of territory are infested and the insect has spread into an adjacent State. Here there is probably less than five square miles of infested territory. The people in the infested districts are ready and anxious to do anything that might be necessary to rid themselves of the pest, but there is nothing that they can do individually except little palliative measures that leaves the great menace to the State at large unaffected.

If eradication is not accomplished, besides the financial losses to Horticulturists, the majority of the inhabitants of the State must expect in a few years at most to have hundreds of these insects patrolling their homes from cellar to garret, day and night, winter and summer.

